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DISINFECTION

AND

DISINFECTANTS.

ADOPTED DECEMBER, 1892.

HEALTH DEPARTMENT

OF THE

CITY OF NEW YORK.

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DISINFECTANTS

AND

METHODS OF DISINFECTION,

AS RECOMMENDED BY THE

HEALTH DEPARTMENT OF THE CITY OF NEW YORK,

DECEMBER, 1892.

DISINFECTION AND DISINFECTANTS.

Sunlight, pure air and cleanliness are always very important agents in maintaining health and in protecting the body against many forms of illness. When, however, it becomes necessary to guard against such special dangers as accumulated filth or contagious diseases, disinfection is essential. In order that disinfection shall afford complete protection, it must be thorough, and perfect cleanliness is better, even in the presence of contagious disease, than poor disinfection.

All forms of fermentation, decomposition and putrefaction, as well as the infectious and

contagious diseases, are caused by minute living germs. The object of disinfection is to kill these germs. Decomposition and putrefaction should at all times be prevented by the immediate destruction, or removal from the neighborhood of the dwelling, of all useless putrescible substances. In order that as few articles as possible shall be exposed to infection by the germs causing the contagious diseases, it is important that all articles not necessary for immediate use in the care of the sick person, especially upholstered furniture, carpets and curtains, should be removed from the sick room at the very beginning of the illness.

AGENTS FOR CLEANSING AND DISINFECTION.

Too much emphasis cannot be placed upon the importance of sunlight, fresh air and cleanliness, both as regards the person and the dwelling, in preserving health and protecting the body from all kinds of disease. Sunlight and fresh air should be freely admitted through open windows, and personal cleanliness should be attained by frequently washing the hands and body.

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Cleanliness in dwellings, and in all places where men go, may under ordinary circum-

stances be well maintained by the use of the two following solutions :

1. *Soap-suds Solution.*—For simple cleansing, or for cleansing after the methods of disinfection by chemicals described below, one ounce of common soda should be added to twelve quarts of hot soap (soft soap) and water.

2. *Strong Soda Solution.*—This, which is a stronger and more effective cleansing solution, is made by dissolving one-half pound of common soda in three gallons of hot water. The solution thus obtained should be applied by scrubbing with a hard brush.

When it becomes necessary to arrest putrefaction or to prevent the spread of contagious diseases by killing the living germs which cause them, more powerful agents must be employed than those required for simple cleanliness, and these are called disinfectants. The following are some of the most reliable disinfectants :

3. *Heat.*—Complete destruction by fire is the best method of disposing of infected articles of small value, but continued high temperatures not as great as that of fire will destroy all forms of life ; thus, boiling or steaming in closed vessels for one-half hour will destroy all disease germs.

4. *Carbolic Acid Solution.*—Dissolve six ounces of carbolic acid in one gallon of hot water. This makes approximately a five-per-cent. solution of carbolic acid, which, for many purposes, may be diluted with an equal quantity of water. The commercial colored impure carbolic acid should not be used to make this solution. Great care must be taken that the pure acid does not come in contact with the skin.

5. *Bichloride Solution* (bichloride of mercury or corrosive sublimate).—Dissolve sixty grains of pulverized corrosive sublimate and two tablespoonfuls of common salt in one gallon of hot water. This solution must be kept in glass, earthen or wooden vessels (not in metal vessels).

The Carbolic and Bichloride Solutions are very poisonous when taken by the mouth, but are harmless when used externally.

6. *Milk of Lime.*—This mixture is made by adding one quart of dry freshly-slaked lime to four or five quarts of water. (Lime is slaked by pouring a small quantity of water on a lump of quick-lime. The lime becomes hot, crumbles, and as the slaking is completed a white powder results. The powder is used to make Milk of Lime.) Air-slaked lime has no value as a disinfectant.

7. *Dry Chloride of Lime.*—This must be fresh and kept in closed vessels or packages. It should have the strong pungent odor of chlorine.

The proprietary disinfectants, which are so often widely advertised, and whose composition is kept secret, are relatively expensive and often unreliable and inefficient. It is important to remember that substances which destroy or disguise bad odors are not necessarily disinfectants.

NOTE.—The cost of the Carbolic Solution is much greater than that of the other solutions, but generally is to be much preferred. When the cost is an important element, the Bichloride Solution may be substituted for all purposes for which the Carbolic Solution is recommended, except for the disinfection of discharges, eating utensils and articles made of metal, and of clothing, bedding, etc., which is very much soiled. Its poisonous character, except for external use, must be kept constantly in mind.

METHODS OF DISINFECTION IN INFECTIOUS AND CONTAGIOUS DISEASES.

The diseases to be guarded against by disinfection are Scarlet Fever, Measles, Diphtheria, Tuberculosis (Consumption), Small Pox, Typhoid and Typhus Fever, Yellow Fever and Cholera.

1. *Hands and Person.*—Dilute the Carbolic Solution with an equal amount of water, or

use the Bichloride Solution without dilution. Hands soiled in caring for persons suffering from contagious diseases, or soiled portions of the patient's body, should be immediately and thoroughly washed with one of these solutions, and then washed with soap and water. The nails should always be kept perfectly clean. Before eating, the hands should be first washed in one of the above solutions, and then thoroughly scrubbed with soap and water by means of a brush.

2. *Soiled Clothing, Towels, Napkins, Bedding, etc.*, should be immediately immersed in the Carbolic Solution, in the sick room, and soaked for twelve hours. They should then be wrung out and boiled in the Soap-suds Solution for one hour. Articles such as beds, woolen clothing, etc., which cannot be washed, should be referred to the Health Department for disinfection or destruction.

3. *Food and Drink.*—Food thoroughly cooked and drinks that have been boiled are free from disease germs. Food and drinks, after cooking or boiling, if not immediately used, should be placed when cool in clean dishes or vessels and covered. In presence of an epidemic of Cholera or Typhoid Fever, milk, and water used for drinking, cooking, washing dishes, etc., should be boiled

before using, and when Cholera is prevalent all persons should avoid eating uncooked fruit, fresh vegetables and ice.

4. *Discharges of all kinds, from the mouth, nose and bowels* of patients suffering from contagious diseases, should be received into glass or earthen vessels containing the Carbolic Solution or Milk of Lime, or they should be removed on pieces of cloth, which are immediately immersed in one of these solutions. Special care should be observed to disinfect at once the vomited matter and the intestinal discharges from Cholera patients, as these alone contain the dangerous germs. In Typhoid Fever the intestinal discharges, and in Diphtheria, Measles and Scarlet Fever, the discharges from the throat and nose, all carry infection and should be treated in the same manner. The volume of the solution used to disinfect discharges should be at least twice as great as that of the discharge. After standing for an hour or more the disinfecting solution with the discharges may be thrown into the water-closet. Cloths, towels, napkins, bedding or clothing soiled by the discharges must be at once placed in the Carbolic Solution and the hands of the attendants disinfected, as described above. In convalescence from Measles and Scarlet Fever the scales

from the skin (peeling) are also carriers of infection. To prevent the dissemination of disease by means of these scales, the skin should be carefully washed daily in warm soap and water. After use, the soap suds should be thrown into the water-closet and the vessel rinsed out with a Carbolic Solution.

5. *The Sputum from Consumptive Patients.*—The importance of the proper disinfection of the sputum (expectoration) from consumptive patients is little understood. Consumption is a contagious disease, and is always the result of transmission from the sick to the healthy or from animals to man. The sputum contains the germs which cause the disease, and in a large proportion of cases is the source of infection. After being discharged, unless properly disposed of, it may become dry and pulverized and float in the air as dust. This dust contains the germs and is the common cause of the disease through inhalation. In all cases therefore, the sputum should be disinfected when discharged. It should be received into covered cups containing the Carbolic or Milk of Lime Solution. Handkerchiefs soiled by it should be soaked in the Carbolic Solution and then boiled. Dust from the walls, mouldings, pictures, etc., in rooms that have been occupied

by consumptive patients, contains the germs, and will produce tuberculosis in animals when used for their inoculation. Therefore, rooms should be thoroughly disinfected before they are again occupied. If the sputum of all consumptive patients were destroyed at once when discharged, a large proportion of the cases of the disease would be prevented.

6. *Closets, Kitchen and Hallway Sinks, etc.*—Each time the closet is used for infected discharges, one pint of the Carbolic Solution should be poured into the pan (after it is emptied) and allowed to remain there. All discharges should be disinfected before being thrown into the closet. Sinks should be flushed at least once daily.

7. *Dishes, Knives, Forks, Spoons, etc.*, used by a patient should be kept for his exclusive use, and not removed from the room. They should be washed first in the Carbolic Solution, then in boiling hot soap-suds, and finally rinsed in hot water. These washing fluids should afterwards be thrown into the water-closet. The remains of the patient's meals may be burned or thrown into a vessel containing the Carbolic Solution or Milk of Lime and allowed to stand for one hour before being thrown away.

8. *Rooms and their Contents.* — Rooms which have been occupied by persons suffering from contagious disease should not be again occupied until they have been thoroughly disinfected by the Health Department. For this purpose either careful fumigation with sulphur will be employed, or this combined with the following procedure: Carpets, curtains and upholstered furniture which have been soiled by discharges, or which have been exposed to infection in the room during the illness, will be removed for disinfection by steam. Woodwork, floors, and plain furniture will be thoroughly washed with the Soap-suds and Bichloride Solutions.

9. *Rags, Cloths and Articles of Small Value*, which have been soiled by discharges or infected in other ways, should be burned.

10. *In case of Death*, the body should be completely wrapped in several thicknesses of cloth wrung out of the Carbolic or Bichloride Solution and placed in an hermetically sealed coffin.

IF NOTIFIED, THE HEALTH DEPARTMENT OF NEW YORK CITY WILL DISINFECT ROOMS AND THEIR CONTENTS WITHOUT COST TO THE TENANT AFTER THE ROOMS HAVE BEEN VACATED BY PERSONS CONVAL-

ESCENT FROM ANY CONTAGIOUS DISEASE. NOTIFICATION SHOULD BE SENT TO THE CHIEF MEDICAL INSPECTOR, NO. 309 MULBERRY STREET. TELEPHONE CALL, NO. 251 SPRING.

It is important to remember that *an abundance of fresh air, sunlight and absolute cleanliness* not only helps protect the attendants from infection, but also aids in the recovery of the sick.

METHODS OF CLEANLINESS AND DISINFECTION TO PREVENT THE OCCURRENCE OF ILLNESS.

1. *Water-closet Bowls and all Receptacles for Human Excrement* should be kept perfectly clean by frequent flushing with a large quantity of water, and as often as necessary disinfected with the Carbolic or Bichloride Solutions. The woodwork around and beneath them should be frequently scrubbed with the hot Soap-suds Solution.

2. *Sinks and the Woodwork around and the floor beneath them* should be frequently and thoroughly scrubbed with the hot Soap-suds Solution.

3. *School Sinks.*—School sinks should be thoroughly flushed with a large quantity of water at least twice daily, and should be

carefully cleaned twice a week or oftener by scrubbing. Several quarts of the Carbolic Solution should be frequently thrown in the sink after it has been flushed.

4. *Cesspools and Privy Vaults.*—An abundance of Milk of Lime or Chloride of Lime should be thrown into these daily, and their contents should be frequently removed.

5. *Cellars and Rooms in Cellars* are to be frequently whitewashed, and, if necessary, the floors sprinkled with dry Chloride of Lime. *Areas and Paved Yards* should be cleaned, scrubbed, and, if necessary, washed with the Bichloride Solution. *Street Gutters and Drains* should be cleaned and when necessary sprinkled with Chloride of Lime or washed with Milk of Lime.

6. *Air-shafts.*—Air-shafts should be first cleaned thoroughly, and then whitewashed. To prevent tenants throwing garbage down air-shafts, it is advisable to put wire netting outside of windows opening on shafts. Concrete or asphalt bottoms of shafts should be cleaned and washed with the Bichloride Solution, or sprinkled with Chloride of Lime.

7. *Hydrant Sinks, Garbage Receptacles, and Garbage and Oyster-shell Shutes and Receptacles* should be cleaned daily, and sprinkled with dry Chloride of Lime.

8. *Refrigerators and the Surfaces around and beneath them*, *Dumb-waiters*, etc., may be cleaned by scrubbing them with the hot Soap-suds Solution.

9. *Traps.*—All traps should be flushed daily with an abundance of water. If at any time they become foul, they may be cleaned by pouring considerable quantities of the hot Strong Soda Solution into them, followed by the Carbolic Solution.

10. *Urinals and the Floors around and underneath them* should be cleaned twice daily with the hot Soap-suds Solution, and in addition to this, if offensive, they may be disinfected with the Carbolic Solution.

11. *Stable Floors and Manure-vaults.*—Stable floors should be kept clean and occasionally washed with the hot Soap-suds, or the hot Strong Soda Solution. Powdered fresh Chloride of Lime may be used in manure-vaults.

12. *Vacant Rooms* should be frequently aired.

13. *The Woodwork in School-houses* should be scrubbed weekly with hot soap-suds. This refers to floors, doors, door-handles, and all woodwork touched by the scholars' hands.

14. *Spittoons in all Public Places* should be emptied daily and washed with the hot Soap-suds Solution, after which a small quantity of the Carbolic Solution or Milk of Lime should be put in the vessel to receive the expectoration.

15. *Elevated and Surface Cars, Ferry-boats and Public Conveyances.*—The floors, door-handles, railings and all parts touched by the hands of passengers should be washed frequently with the hot Soap-suds Solution. Slat-mats from cars, etc., should be cleaned by scrubbing with a stiff brush in the hot Soap-suds Solution.

Use of Bromine Solution as a Deodorant.

Slaughter Houses, Butchers' Ice Boxes and Wagons, Trenches, Excavations, Stable Floors, Manure-vaults, Dead Animals, Offal, Offal Docks, etc., may be deodorized by a weak Solution of Bromine, which is a valuable agent for this purpose. The Bromine Solution, however, is only temporary in its action and must be used repeatedly. It should be applied by sprinkling. Although somewhat corrosive in its action on metals, it is otherwise harmless.

The Solution of Bromine must be prepared with great care, as the pure bromine from which it is made is danger-

ous. It is very caustic when brought in contact with the skin; it is volatile and its fumes are extremely irritating if inhaled. In preparing this solution in large quantities, a pound bottle of bromine should be dropped into a barrel containing forty or fifty gallons of water, and then broken under water with an iron bar. The solution is completed by thoroughly stirring. To prepare a smaller quantity an ounce bottle of bromine may be dropped into a pail containing three or four gallons of water, and broken in the same way and with the same care.

THE STERILIZATION OF MILK FOR FEEDING INFANTS.

Sterilization is the process employed to destroy the germs contained in milk. Germs produce fermentation (souring) and render the milk unfit to be used as an article of food for infants. Milk, as it reaches the city, even if great care has been taken in its collection and shipment, contains germs, and these will produce fermentation, although the milk is kept on ice. Unclean vessels hasten this process. No matter how good milk may be in the morning, when comparatively fresh, toward evening, unless it has been partly or completely sterilized, it may be dangerous to an infant, and may cause fatal illness, even though it still tastes sweet.

Complete sterilization destroys all the germs in milk, and so prevents permanently fermentative changes; by partial sterilization

many of the germs may be destroyed, so that the milk will remain wholesome for at least twenty-four hours in the warmest weather.

Milk is best sterilized for infants by steam. It may be sterilized at a high or low temperature; that is, at the boiling temperature (212° F.), which is high sterilization, or at a lower degree of heat obtained by modifying the steaming process.

It has been found that milk sterilized at a high temperature (212° F.) is not desirable for prolonged use, as the high temperature causes certain changes in the milk, which make it less suitable as a food for infants. These changes are in part avoided if a temperature lower than boiling is used. It is recommended that the lowest temperature be used, for partial sterilization, which will keep the milk wholesome for twenty-four hours in the warmest weather (Koplik).

The utensils necessary are—

(*a*) A tin pail or pot, about ten inches deep by nine inches in diameter, provided with the ordinary tin cover, which has been perforated with eight holes, each an inch in diameter. The holes should be arranged in a circle, midway between the border of the cover and its centre. The centre is also perforated with an opening of the same size.

(*b*) A wire basket, with eight nursing bottles (as sold in the shops for this purpose).

(*c*) Rubber corks for the bottles, and a bristle brush for cleaning them.

Directions (Koplik)—Place the milk, pure or diluted (as the doctor may direct), in the nursing-bottles, and place the latter in the wire basket. Put only sufficient milk for one nursing in each bottle. Do not cork the bottles at first.

Having previously poured about two inches of water in the tin pail or pot, and brought it to the boiling point, lower the basket of nursing bottles slowly into the pot. Do not allow the bottles to touch the water, or they will burst. Put on the perforated cover, and let the steaming continue for ten minutes; then remove the cover and firmly cork each bottle. After replacing the cover, allow the steaming to continue fifteen minutes longer in the winter and twenty minutes longer in the summer. The steam must be allowed to escape freely, or the temperature will rise too high.

The process of sterilization is now completed. Place the basket of bottles in a cool dark place or in an ice chest. The bottles must not be opened until just before the milk is to be used, and then it may be warmed

by plunging the bottle in warm water. If properly prepared the milk will taste but little like boiled milk. There will not be a thick ring around the inside of the bottle, and no butter will be seen floating on the surface.

The temperature attained under the conditions stated above will not exceed in extreme cases 188° F.

Milk should be sterilized when it is as fresh as possible and only sufficient milk for twenty-four hours should be sterilized at one time. If, after nursing, the infant leaves some milk in the bottle, this should be thrown away.

Care of the Bottles is Important.—After nursing, the bottles should be filled with a strong solution of washing soda, allowed to stand 24 hours, and then carefully cleaned with a bristle (bottle) brush. Minute particles of dry or stale milk allowed to remain in the bottle are dangerous to the infant. The rubber corks and nipples should be boiled after using in strong soda solution for 15 minutes, and then rinsed and dried.

After sterilizing, milk should never be put into unsterilized bottles, as this will spoil it.

CONCLUSION.

The general principles of disinfection outlined in this circular may be applied for the disinfection of all articles not specifically treated of, and which are similar in character to those considered.

By order of the Board of Health,

CHARLES G. WILSON,
President.

EMMONS CLARK,
Secretary.

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